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Breeding sites of gulls, terns, and jaegers at Îles du Large, Resolution Bay, and along the west shore of Great Slave Lake, Northwest Territories

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Abstract

A comprehensive survey of larid breeding sites in Great Slave Lake was begun in 1986. Its main objective is to assess the size of the population of Caspian Terns *Sterna caspia*, a species classified as "vulnerable" by the Committee on the Status of Endangered Wildlife in Canada. Three new areas were surveyed in 1989: the west shore from Whitebeach Point to Slave Point, Resolution Bay, and Îles du Large. The four largest known colonies on Great Slave Lake were visited during this survey. Larids were most abundant on the west shore and least abundant at Îles du Large. However, the largest colony, Egg Island (733 nests), was in Resolution Bay, near the Slave Delta.

Larids were observed at 43 sites. In total, 2356 nests of seven species were found. In order of abundance they were California Gull *Larus californicus*, Herring Gull *L. argentatus*, Caspian Tern, Arctic Tern *S. paradisaea*, Ring-billed Gull *L. delawarensis*, Common Tern *S. hirundo*, and Parasitic Jaeger *Stercorarius parasiticus*. Mew Gulls *L. canus* and one Bonaparte's Gull *L. philadelphia* were observed, but breeding was not confirmed in the study area. Concentrations of California Gulls, Caspian Terns, and Parasitic Jaegers were the largest ever found in Great Slave Lake. One Key Habitat Site for Caspian Terns was identified on the west shore: a small islet near Northwest Point with 110 nests. Perhaps as much as one-half of the Great Slave Lake population of Caspian Terns and one-third of the Northwest Territories population nested there. The significance of Great Slave Lake to colonial waterbirds is briefly discussed.

Introduction

Great Slave Lake (GSL), with an area of 28 930 km^2, is the fifth largest lake in North America and the second largest lake north of 60°N. However, the significance of this massive freshwater ecosystem to migratory birds is poorly known.

Larids are the only colonial waterbirds that nest on the lake. In 1986, the Canadian Wildlife Service began a comprehensive survey of all larid breeding sites. Ten breeding species have been recorded. According to counts of nests at these sites, the nine most common species are, in order of abundance: Herring Gull *Larus argentatus*, Common Tern *Sterna hirundo*, California Gull *L. californicus*, Ring-billed Gull *L. delawarensis*, Arctic Tern *S. paradisaea*, Mew Gull *L. canus*, Caspian Tern *S. caspia*, Parasitic Jaeger *Stercorarius parasiticus*, and Bonaparte's Gull *L. philadelphia*. Black Terns *Chlidonias niger* also nest in nearby marshes (JS, unpubl. data).

Most of the North Arm (Fig. 1) has been surveyed, and nearly 2400 nests have been counted at 125 breeding sites (McCormick and Sirois 1988; Sirois et al. 1989; Sirois and Seddon 1990). These include at least 90 nests of Caspian Terns, which were previously unreported for GSL. The Caspian Tern is classified "vulnerable" by the Committee on the Status of Endangered Wildlife in Canada (1990). There are only two known breeding areas for Caspian Terns in the Northwest Territories (NWT): the GSL region, and Akimiski Island in James Bay (American Ornithologists' Union 1983; Godfrey 1986).

This note presents the results of a survey conducted in June 1989. Three areas were surveyed: the west shore between Whitebeach Point and Slave Point; Resolution Bay; and Îles du Large (Fig. 1). Our objectives were:

(1) to determine the distribution and abundance of Caspian Terns and other larids; and

(2) to assess these areas as potential Key Habitat Sites for migratory birds (SAA and K.J. McCormick, unpubl. data).

Study area

The centre of GSL is located at approximately 62°30′N, 114°W. The lake lies on the western edge of the Precambrian Shield, in two ecoregions (Wiken 1986). The Taiga Shield encompasses the northern and eastern shores, including Îles du Large. The Taiga Plains encompasses all of the west and south shores, to the east side of the Slave Delta. The west shore of the lake features gently rolling relief covered by dense boreal forest, large, shallow bays, and few islands, which are usually treed. The south shore, between the Hay River and the Slave River, is similar to the west shore but, with the exception of Resolution Bay, has neither islands nor large bays. At Îles du Large, all islands are relatively small and consist of Precambrian outcrops with little or no soil or vegetation. Some larger islands feature a few stunted trees; others are partly covered by low, tundra-like vegetation.

The region is characterized by a subhumid, high-boreal climate (Ecoregions Working Group 1989). Being close to the treeline (about 200 km to the northeast) and the frigid East Arm, Îles du Large are subject to sub-Arctic conditions. There are 70–100 frost-free days per year, and ice-free waters occur in shallow areas from mid-May to mid-October. GSL is usually ice-bound from mid-December

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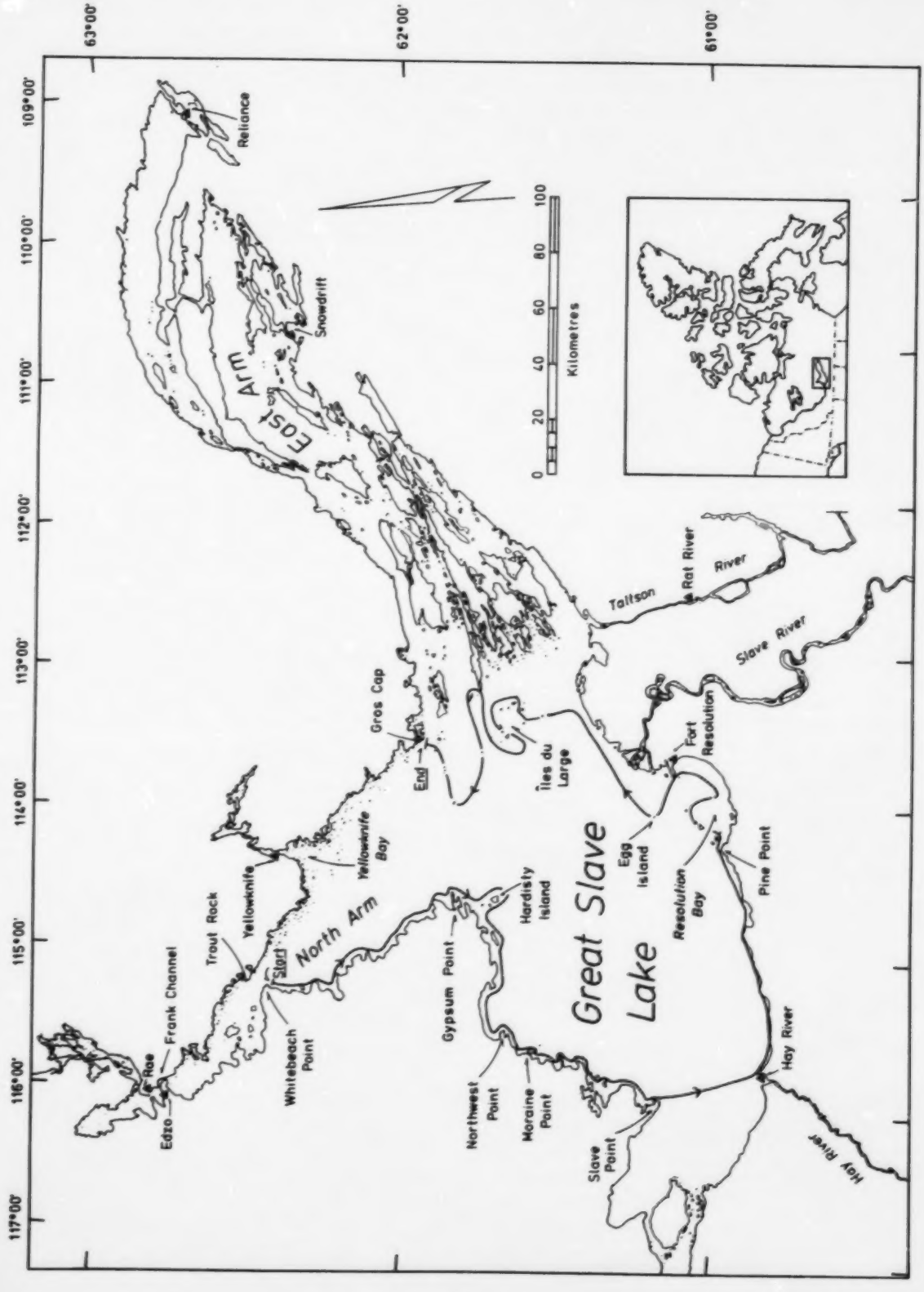
Figure 1
Location of the study area and of the approximate survey route in June 1989



until early May. Drifting ice occurs until mid-June. On exposed islands, growth of white birch *Betula papyrifera* leaves begins two weeks later than on the mainland. Summer days are long; the sun remains above the horizon for 20 h at the solstice. Mean daily July temperature is 16°C.

GSL is oligotrophic and mainly deep, cold, and clear. However, the water is shallow and very turbid in the inner North Arm and near the Slave Delta, including Resolution Bay. Water levels are stable, particularly since the construction of the Bennett dam on the Peace River in British Columbia (Cheng and Bennett 1975). They have fluctuated between 156.637 and 156.750 m above sea level in the last five years (Environment Canada 1990).

Hay River (population <3000) and Fort Resolution (population <450) are the only two human settlements along the survey route. No significant agricultural land occurs along or near that route, and only one small fish plant is located on the west shore, at Moraine Point. There is apparently little human refuse for larids to scavenge upon within the study area.

Methods

Two observers in a motorboat examined all potential larid nesting sites on 21–25 June 1989. The survey route included 950 km of shoreline and offshore waters. Flocks of gulls or terns usually signaled the presence of a breeding site. Surveys began in the morning and continued into the late evening. Locations of islands were determined from 1:50 000 and 1:250 000 National Topographic Series maps. Total ground counts of nests of all larids were made at each breeding site. Data were collected on clutch size and the presence of young. Because it is often not possible to distinguish between the nests and eggs of Arctic Terns and those of Common Terns, all adults flying above the nests were identified where these species occurred. Because it was not practical to stop at each islet where small numbers of birds nested, at some locations only numbers of adults were counted. These may have included nonbreeding birds. Disturbance to breeding birds was minimized by keeping our visits as short as possible.

Results and discussion

In total, 2356 nests of seven species were found at 34 sites. An additional 166 adults were counted where either nests were not found or landing was not practical; they were considered probable breeders. Accordingly, larids were observed at a total of 43 sites (Table 1). Nearly half (47%) of the nests were along the west shore, followed by Resolution Bay (33%) and Îles du Large (20%). The main features of the three areas are discussed below.

Regional accounts

The west shore (sites 1–14): 1096 nests. Few nesting larids were found between Whitebeach Point and Hardisty Island (145 nests at eight sites; Fig. 2), and nearly two-thirds of these nests were on Gypsum Island (site 5). The low numbers between Frank Channel and Hardisty Island likely result from the lack of nesting habitat. There are few islands, and those that occur are covered by trees.

Six breeding sites were found between Hardisty Island and Slave Point, three of which supported large colonies. Over 350 nests were counted on Found Island (site 11) and on Gooseberry Island (site 14). These two islands consisted of boulders of varying sizes covered by a shrubby meadow. Site 10, south of Northwest Point, supported 157 nests, including 110 nests of Caspian Terns. It was a small, unvegetated islet of boulders with a flat top. This is the largest known concentration of nesting Caspian Terns on GSL.

California Gulls were dominant on the west shore (67% of the nests), followed by Herring Gulls (17%) and Caspian Terns (10%). The relatively large number of larids on the southwestern shore is likely due to the presence of treeless islands and good foraging grounds. Lush wetlands, where invertebrates and small fish likely abound, surround the large, shallow bays. The presence of a fish plant at Moraine Point and numerous fishing nets in the area also suggests that there is an abundance of fish.

Resolution Bay (sites 15–17): 778 nests. Only three breeding sites were found in Resolution Bay (Fig. 3). Egg Island (site 17) was the only significant colony. It comprised 733 nests, including 689 nests of California Gulls and 44 nests of Herring Gulls. Four Arctic Terns were also observed, but no nest was found. The nests were concentrated in a discontinuous ring around the island, on the narrow beach of boulders. Many nests were built on log piles that littered the beach. The island is about 200 m long and 100 m wide and is covered by a meadow. A small grove of trembling aspens *Populus tremuloides* covers its western tip. The nesting gulls occupied less than 5% of the island.

J. Dewey Soper (1952) estimated that between 6000 and 7000 California Gulls, including breeders and nonbreeders, and 100 Arctic Terns, but no Herring Gulls, occurred on Egg Island on 25 July 1951. However, he did not count nests, as it was likely too late in the breeding season to do so. He also suggested that up to 10 000 California Gulls, including fledglings, may have been present at the end of the summer.

Based on the assumption that two birds are present for each nest counted, 1378 breeding California Gulls were present on 24 June 1989. No young had hatched yet. As only one young usually fledges from each nest (Vermeer 1970), there could be about 2100 California Gulls on Egg Island at the end of the summer. Although this estimate excludes nonbreeding gulls, a subjective assessment suggested that large numbers of nonbreeders were not present during our visit.

If Soper's estimate was correct, and if large numbers of nonbreeders, or failed breeders, do not congregate at Egg Island in late July, the island has seen its California Gull colony decline by as much as 80% and its Arctic Tern colony virtually disappear in the last 40 years. It has also seen the establishment of approximately 100 Herring Gulls. Whether or not Herring Gulls have displaced the other species is not clear, given that they are relatively few in number compared with California Gulls and that over 90% of Egg Island's surface is still available for larids to nest on.

Nor could one pair of Bald Eagles *Haliaeetus leucocephalus*, which nested in the aspen grove but which was apparently absent during Soper's visit, have such an impact. There were less than 30 gull wings under the nest, which does not indicate an exceptionally high level of predation. Finally, egging by residents of Fort Resolution still occurs but is apparently minimal, because ice conditions often preclude access to the island during the early stages of incubation (D. Beaulieu, pers. commun.). Also, road access to the community was established in the 1960s and has rendered a wide variety of commercial food items, including eggs, available.

Egg Island contains the largest concentration of nesting larids found on GSL in the last five years. This island and the nearby Slave Delta apparently provide good larid nesting and foraging habitat. Herring Gulls and Arctic Terns that nested on Birch Island and near Dawson Landing in the past (B.C. Research 1978) were not seen during this survey.

Table 1
Number of nests and adults[a] at confirmed and probable larid breeding sites on the west shore of Great Slave Lake, in Resolution Bay, and at Îles du Large, June 1989

Site No.	Location, UTM grid	Caspian Tern nests	Common Tern nests	Arctic Tern		Herring Gull		California Gull nests	Ring-billed Gull nests	Parasitic Jaeger		Total	
				Nests	Adults	Nests	Adults			Nests	Adults	Nests	Adults
1	NV 90 20	—	—	—	—	—	2	—	—	—	—	—	2
2	NV 89 18	—	—	—	—	—	12	—	—	—	—	—	12
3	PU 24 70	—	12	—	—	1	—	—	3	—	—	16	—
4	PU 24 69	1	—	1	—	21	—	—	4	—	—	27	—
5	PU 25 65	—	10	—	—	22	—	46	15	—	—	93	—
6	PU 23 51	—	—	—	—	—	14	—	—	—	—	—	14
7	PU 24 52	—	—	—	—	—	6	—	—	—	—	—	6
8	PU 26 49	—	—	—	—	5	—	4	—	—	—	9	—
9	NU 94 46	—	—	—	—	18	—	—	—	—	—	18	—
10	NU 79 39	110	—	—	—	12	10	35	—	—	—	157	10
11	NU 77 35	—	—	—	—	70	—	299	1	—	—	370	—
12	NU 69 23	—	—	—	—	—	24	—	—	—	—	—	24
13	NU 65 07	—	—	—	—	24	—	11	15	—	—	50	—
14	NU 64 03	—	—	—	—	12	—	344	—	—	—	356	—
15	PT 51 69	—	—	—	—	24	—	7	—	—	—	31	—
16	PT 54 68	—	—	—	—	14	—	—	—	—	—	14	—
17	PT 59 92	—	—	—	4	44	—	689	—	—	—	733	4
18	UD 73 29	—	—	—	—	24	—	24	—	—	—	48	—
19	UD 75 32	—	—	39	—	—	—	—	—	1	2[b]	40	2
20	UD 74 33	—	—	—	—	17	—	—	—	—	—	17	—
21	UD 75 34	1	—	—	2	21	—	6	—	—	—	28	2
22	UD 71 41	—	—	—	—	—	12	—	—	—	—	—	12
23	UD 72 41	—	—	—	—	4	—	—	—	—	—	4	—
24	UD 78 42	—	—	—	—	—	2	—	—	—	—	—	2
25	UD 80 41	—	—	—	—	11	—	—	—	—	—	11	—
26	UD 78 51	1	—	1	10	11	—	—	—	—	—	13	10
27	UD 78 50	—	—	—	—	—	—	—	—	1	—	1	—
28	UD 67 42	1	—	—	—	46	—	31	—	—	—	78	—
29	UD 68 46	—	—	—	—	—	2	—	—	1	—	1	2
30	UD 65 46	—	—	—	—	18	—	23	—	—	—	41	—
31	UD 66 47	—	—	—	8	—	2	—	—	1	—	1	10
32	UD 68 48	—	—	—	—	3	—	—	—	—	—	3	—
33	UD 85 57	—	—	—	—	6	—	—	—	1	—	7	—
34	UD 77 58	—	—	—	—	—	2	—	—	1	—	1	2
35	UD 76 58	—	—	—	—	—	10	—	—	—	—	—	10
36	UD 73 58	—	—	—	—	—	30	—	—	1	—	1	30
37	UD 74 54	—	—	—	—	6	—	—	—	1	—	7	—
38	UD 71 54	—	—	15	—	—	—	—	—	1	—	16	—
39	UD 68 53	—	—	—	—	—	12	—	—	—	—	—	12
40	UD 61 54	—	—	—	—	13	—	23	—	—	—	36	—
41	UD 44 64	1	—	—	—	11	—	71	—	—	—	83	—
42	UD 57 68	—	—	20	—	2	—	—	—	—	—	22	—
43	UD 64 70	—	—	—	—	13	—	10	—	—	—	23	—
Total		115	22	76	24	473	140	1623	38	9	2	2356	166

[a]Adults in breeding plumage whose nests were not found, or adults suspected to nest on islets that we did not search.
[b]There were two pairs of jaegers at this site, but we found only one nest.

Figure 2
Larid breeding sites on the west shore of Great Slave Lake, June 1989

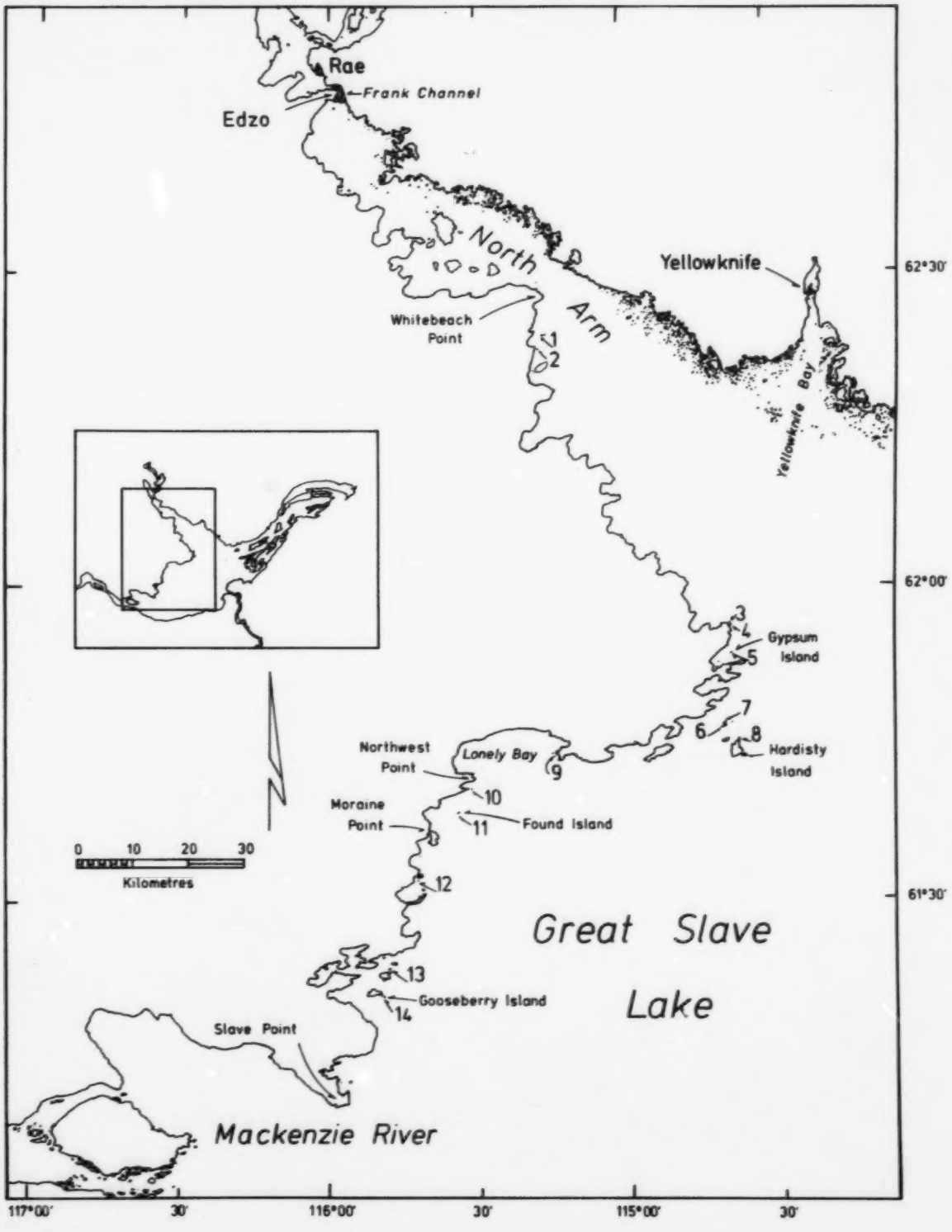
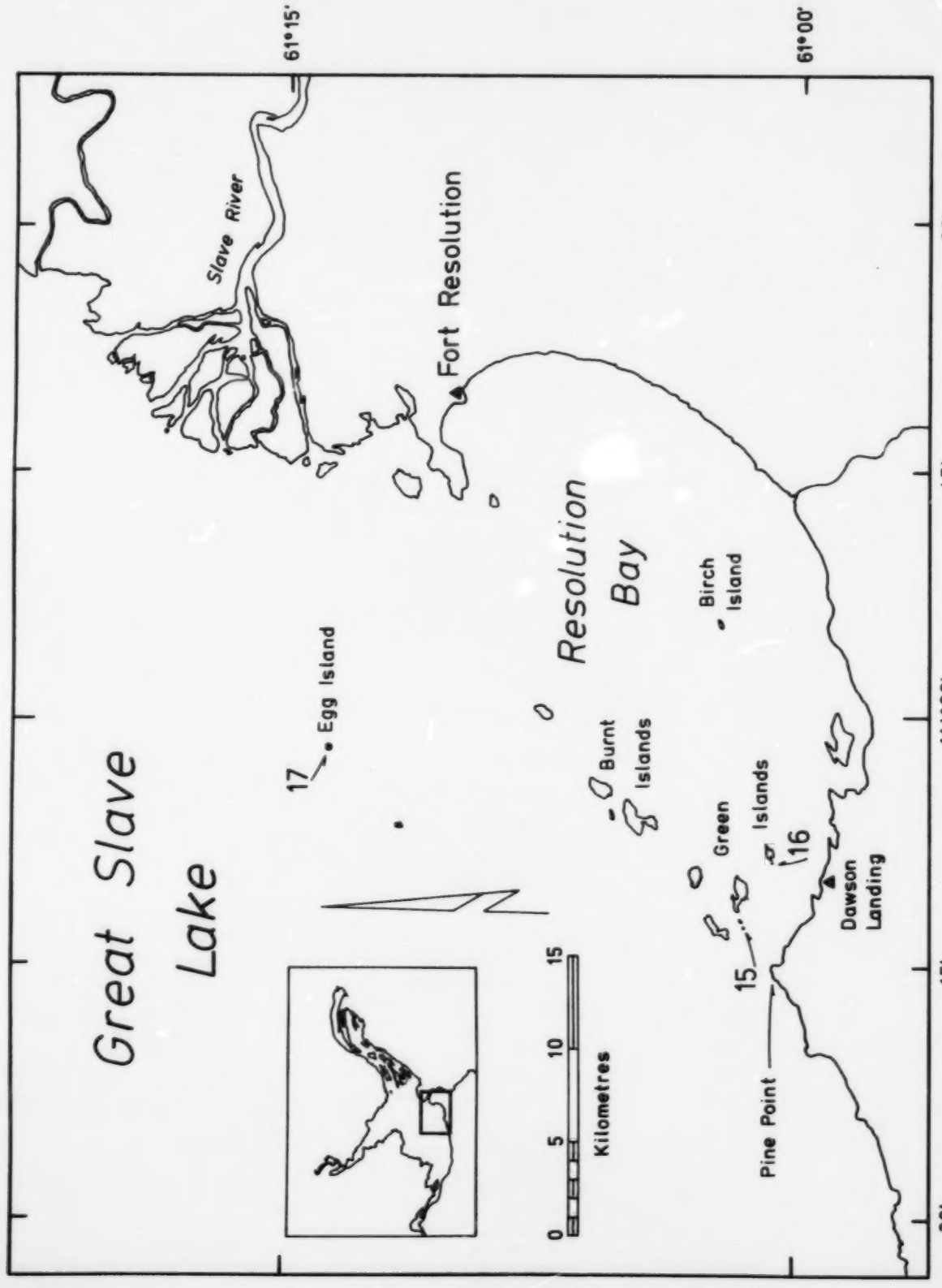


Figure 3
Larid breeding sites in Resolution Bay, June 1989



Îles du Large (sites 18–43): 482 nests. These islands comprise Îles du Goulet, Iron Islands, Outpost Islands, Butte Island, and other unnamed islands. For the purpose of this survey, we have also included Harris Island, Jackson Islands, Outer and Inner Whaleback Rocks, and Îles Basses (Fig. 4). This area features several small colonies where Herring Gulls were slightly more common (206 nests) than California Gulls (188 nests). The largest colony comprised 78 nests (site 28). An additional 96 adults, mostly Herring Gulls, were seen, but their breeding status was not confirmed.

Ten pairs of Parasitic Jaegers, nine of which were confirmed nesters, were concentrated within a 15-km radius of Outpost Islands. We know of no other concentrations of jaegers in GSL. The jaegers showed a clear preference for exposed islands partly or entirely covered by tundra. There are many such islands at Îles du Large, where cold winds and waters from the East Arm give a distinct sub-Arctic to low-Arctic character to the archipelago.

The pattern of larid distribution at Îles du Large is similar to that found on the north shore of the North Arm. The colonies are small and scattered about the numerous small, bare Precambrian islands. The relatively low numbers of breeding larids likely reflect the low biological productivity of the immediate area. The surrounding "pelagic" waters seem poor compared with the nearby shallows along the mainland shore, where wetlands, invertebrates, and small fishes abound. We suspect that many gulls that nest here forage regularly in the much richer Slave Delta, 30–50 km to the southwest.

Intervening areas not surveyed: the Hay Delta, the south shore between Hay River and Pine Point, and the Slave Delta. These three areas (Fig. 1) were found to provide marginal larid nesting habitat. The Hay Delta features a few large treed or shrubby islands subject to large water fluctuations in the spring. Much of the delta is taken over by human activities, including the extensive port facilities of the Northern Transportation Company Ltd. The delta lies within the city limits of Hay River. Because of the presence of human refuse, it is possible that several pairs of gulls, particularly Herring Gulls, nest there, but few were present during our visit. The south shore between Hay River and Pine Point is very exposed, devoid of islands, and mostly covered by vegetation. Larid nesting habitat appeared particularly marginal there. There were few nesting larids in the Slave Delta in 1986 (JS, pers. obs.). Most of the deltaic islands are covered by trees or wetlands and are subject to spring floods. In 1986, a small colony of Black Terns was located in a marsh in the inner delta.

Species accounts

California Gull: 1623 nests. During previous surveys in the North Arm (1986–1988), California Gulls were less abundant than Herring Gulls. In this survey, California Gulls were more than three times as abundant as Herring Gulls. They always nested in colonies with other larid species and formed the core of the largest colonies. They were found at 15 sites and averaged 108 pairs per site (Table 1).

Although observed feeding on human refuse, this species appears to be predominantly insectivorous in GSL (JS, pers. obs.). During the spring, they regularly feed on floating insects that accumulate along the ice edge in windy conditions. They also pick up insects on the ice. Later in the summer, they gorge themselves on arthropod fallout, which carpets the water surface. We suspect that their predominance on the west shore and in Resolution Bay results partly from abundant supplies of invertebrates in nearby wetlands. Also, the nesting habitat in these two areas is similar to that found farther south in the Prairie provinces.[1] In Canada, this species breeds almost exclusively in Manitoba, Saskatchewan, and Alberta (American Ornithologists' Union 1983; Godfrey 1986; Poston et al. 1990).

The average clutch size (2.15 eggs; n = 1623) was lower than those reported by Jehl et al. (1990; ~2.45) and Vermeer (1970; 2.77) for gulls from Beaverhill and Miquelon lakes in Alberta, but higher than that reported by Winkler (1985; ~2.0) for gulls from Mono Lake, Calif. The lower average clutch size in GSL, compared with those of two Alberta lakes, is likely related to the lower productivity of GSL. This lower productivity is also reflected by the size of the colonies, which are usually much smaller than those in the Canadian Prairie provinces and the western United States (Conover 1983; Poston et al. 1990). The GSL population is the northernmost breeding population on the continent (American Ornithologists' Union 1983; Godfrey 1986; Jehl 1987).

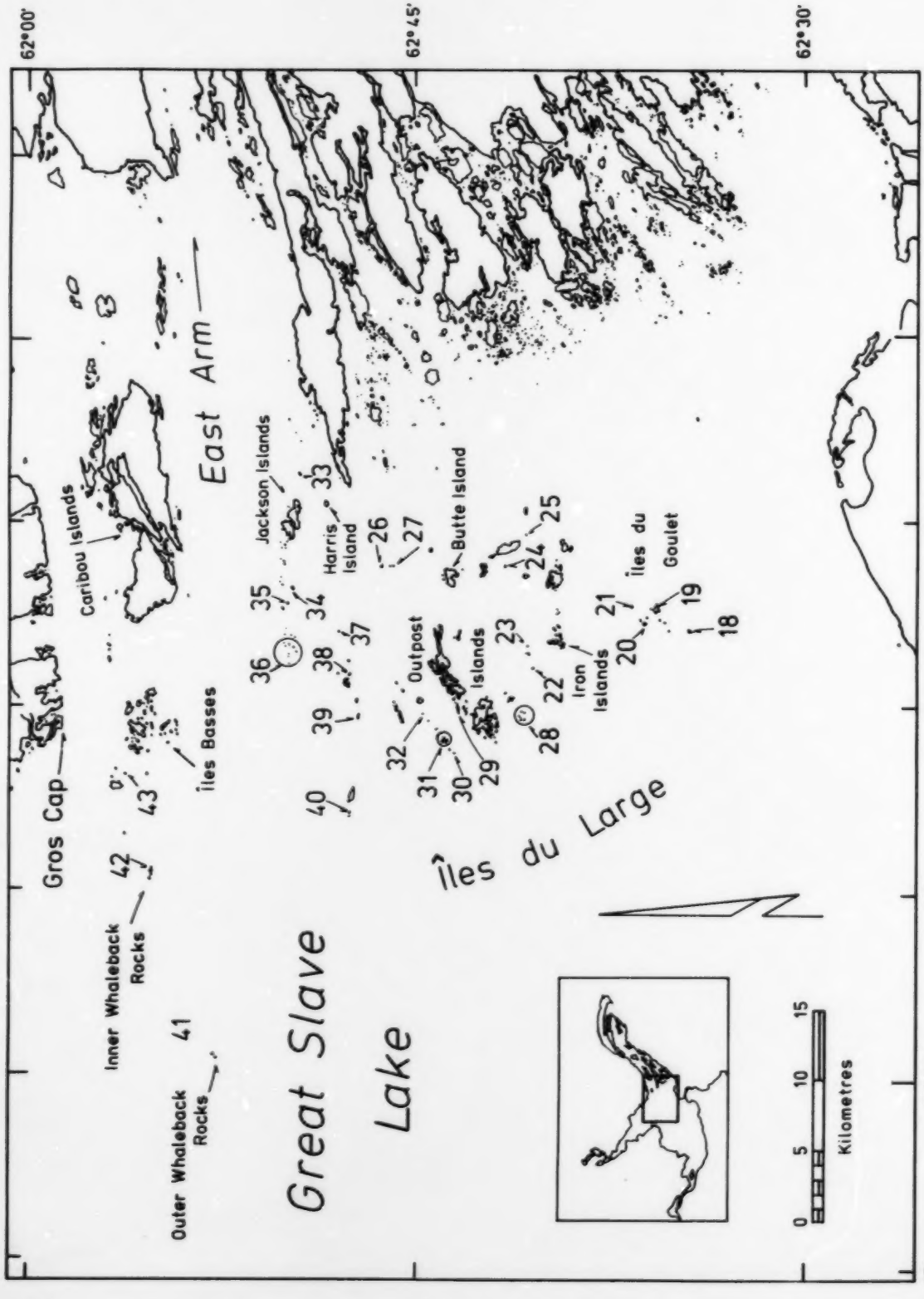
Herring Gull: 473 nests. The status of this species is difficult to assess, because single pairs that nest commonly on isolated islets and islands may go unnoticed. In Yellowknife Bay, single pairs have been observed to nest later than nearby colonial conspecifics. Because of time constraints, it was not possible to confirm nesting of all single pairs or small groups: 140 of the 166 adult larids whose nesting status was not determined were Herring Gulls (Table 1).

The Herring Gull was the most widely distributed species. It was present at 27 of the 34 confirmed breeding sites, either alone or with other species. An average of 17.5 pairs occurred at these sites, but as many as 70 pairs nested at Found Island. The proximity of the Moraine Point fish plant probably attracted many pairs. One to four young were already present at 30% of the nests. It appeared that Herring Gulls began nesting at least 7–10 d before other larids. In Yellowknife Bay, Herring Gulls are always the first larids to return to the nesting islands in May (JS, pers. obs.). Except for one nest of California Gulls with two hatchlings, no young of any other species were observed.

At the Outer Whaleback Rocks, where there is no soil or vegetation, some Herring Gulls had built their nests with wings of Willow Ptarmigan *Lagopus lagopus* and Red-breasted Merganser *Mergus serrator*. These birds were probably killed by Bald Eagles or hunters and their wings subsequently gathered by gulls.

[1]The west shore and Resolution Bay belong to the Taiga Plains ecoregion, where habitat is often similar to that found farther south in the Great Plains.

Figure 4
Larid breeding sites at Îles du Large, June 1989



Caspian Tern: 115 nests. Of the 115 nests found, 110 belonged to the Northwest Point colony (site 10). The remaining pairs nested individually but always with other larids. Only four nests were found at Îles du Large, an area thought to be rather unproductive (see above), and no nests were found in Resolution Bay. The turbidity of the water in Resolution Bay probably prevents this plunge-diver from foraging successfully and hence discourages it from nesting there.

The GSL population is the northernmost breeding population in North America (American Ornithologists' Union 1983), and we do not know of sightings north of the lake. The largest and closest population occurs in Manitoba, where over 2000 pairs nested in the late 1980s (B. Koonz, pers. commun.). Less than 200 pairs have nested in Saskatchewan and Alberta in the recent past (S. Bretchtel, K. Roney, and A.L. Smith, pers. commun.).

The 115 clutches averaged 2.0 eggs. They usually contained two eggs (77%), but single-egg (12%) and three-egg (10%) clutches were also observed. This average compares with the average (1.8 eggs) found in the North Arm in 1986 but falls short of the 2.8 eggs found by Ludwig (1965) in the Great Lakes. However, Evans et al. (1970) reported an average of 1.7 eggs in Manitoba. Although their productivity is likely lower in northern latitudes, the GSL terns are not subject to drought or to flooding of their nesting islands. Late springs, which inhibit nesting in some local larids, may have similar effects on this species. Chemical pollution and human disturbance, which threaten them in southern Canada (Martin 1978), are likely much less intense in GSL.

Arctic Tern: 76 nests. Although seen in relatively small numbers in this survey, Arctic Terns were at least three times more abundant than Common Terns. In the North Arm in 1986–1988, they were half as abundant as Common Terns. Contrary to past surveys, these species were not observed to nest together. All but one nest were at Îles du Large, where gulls were the least numerous. In contrast, the absence of Arctic Terns on the west shore and in Resolution Bay, where relatively large numbers of gulls occurred, may be the result of competition from gulls.

The exclusive presence of Arctic Terns at Îles du Large likely results from the sub-Arctic to low-Arctic nature of the habitat and ice conditions there. In other parts of GSL surveyed in the past, Arctic Terns usually nested on exposed islands as well, where surrounding ice melts later. Common Terns usually nested in areas where open water occurs earlier in the spring.

Arctic Terns nest commonly, but in small numbers and often in single pairs, throughout the region. At this longitude, the southern limit of their breeding range is approximately 500 km south of GSL (Godfrey 1986).

Ring-billed Gull: 38 nests. Only a few nests of Ring-billed Gulls were found, and all were on the west shore. They always nested with other larid species. At site 13, 15 nests were built on the lower beach, where they were very vulnerable to storms. These few nests located in marginal habitat suggest that this species is attempting to colonize this area. Godfrey (1986) indicated that this species is currently expanding its range in Canada but did not give any breeding record for the Mackenzie District of NWT. Added to the nests found in the North Arm in 1986–1988, about 350 nests have been counted in GSL. This is apparently the northernmost breeding population of Ring-billed Gulls on the continent (American Ornithologists' Union 1983; Godfrey 1986).

Common Tern: 22 nests. A few nests were found at two locations on the west shore. Ten nests were on Gypsum Island (site 5), and 12 nests were at site 3. These two islands are close to the Frank Channel – Trout Rock area, across the North Arm (Fig. 1), where hundreds of nests of Common Terns have been recorded in the past, and where water is shallow and ice usually melts early. Common Terns were probably few along the survey route because nowhere did the nesting habitat appear similar to that found between Frank Channel and Trout Rock. All islands were relatively exposed and in areas where ice breakup can be late. Godfrey (1986) suggested that the GSL breeding population is the northernmost on the continent.

Parasitic Jaeger: nine nests. This Arctic nester is widely distributed in northern Canada. The southern limit of its breeding range in mainland NWT corresponds roughly to the treeline (Godfrey 1986). Godfrey reported breeding records for GSL, probably from the West Mirage Islands near Yellowknife Bay (Weller et al. 1969; Trauger and Bromley 1976). Past surveys and recent observations in the North Arm have located at least nine pairs, six of which were confirmed nesters scattered between Trout Rock and Gros Cap (Fig. 1). These pairs nested solitarily on offshore exposed islands, usually in close proximity to other larid nesting islands.

Ten more pairs, including nine confirmed nesters, were found in this survey. All were near Outpost Islands (Fig. 4). The Precambrian islands they nested on all have vegetation characteristic of the Arctic tundra, 200 km to the northeast.

Mew Gull. No nest or other evidence of breeding was found in the study area, but 30 individuals were seen surface-feeding on the west shore near Whitebeach Point. Past surveys have shown that Mew Gulls nest widely, but scattered in small numbers, among the myriad islands across the North Arm, on the edge of the Precambrian Shield. They usually favour islands close to the mainland, where exposure to offshore conditions is reduced. Mew Gulls regularly nest in single pairs that may go unnoticed. For example, in 1990, three adults and three nestlings were seen together on the mainland shore near Hardisty Island (JS, pers. obs.), where none was seen in 1989.

Bonaparte's Gull. No nest was found, and only one adult Bonaparte's Gull was observed on the west shore. This species nests on GSL but appears much more abundant in adjacent small lakes. After this survey, in July 1989, we found six active nests on islands in Yellowknife Bay, but only after intensive searches. All were single tree-nesting

pairs. In contrast, at least 12 active pairs with their young and at least 40 additional adults were easily located in a small area along the Mackenzie Highway near Yellowknife, where lakes and ponds abound.

Significance of the study area and of Great Slave Lake to colonial waterbirds

The four largest known colonies on GSL were visited during this survey. They were Egg Island (733 nests; site 17), Found Island (370 nests; site 11), Gooseberry Island (356 nests; site 14), and one unnamed islet south of Northwest Point (157 nests; site 10). The three former sites were primarily California Gull colonies; the latter site was a Caspian Tern colony. California Gulls, Herring Gulls, and Caspian Terns were the most abundant species in the study area, with 69%, 20%, and 5% of the nest records, respectively.

The presence of relatively large colonies on the west shore and in Resolution Bay is a reflection more of the scarcity of treeless islands than of a large population of larids. More larids (about 2380 nests) were found in the North Arm between Frank Channel and Gros Cap (Fig. 1), which is a smaller area but with thousands of islets and islands. Colonies there never exceeded 100 nests, however, and most were under 50 nests.

A Key Habitat Site was identified for the Caspian Tern. One hundred and ten nests were concentrated on one islet south of Northwest Point. This represents over 1% of the estimated national population, assumed to average about 8000 pairs (Cairns et al. 1986; H. Blokpoel, S. Brechtel, R.W. Campbell, G. Chapdelaine, B. Koonz, K. Roney, A.R. Lock, R.I.G. Morrison, and A.L. Smith, pers. commun.). Up to one-half of the GSL population and one-third of the NWT population may nest at Northwest Point.

Larids were the only colonial waterbirds observed to nest in the study area. However, in the last two years, up to 1200 American White Pelicans *Pelecanus erythrorhynchos* have been reported feeding in rapids along the Taltson River, near Rat River, 30 km from GSL (Fig. 1; J. McPherson, pers. obs.). A few individuals have also been seen at Fort Resolution and at Hay River (D. Beaulieu, pers. obs.).

Fewer larids breed in GSL than in the Great Lakes. However, GSL features a unique assemblage of northern and southern larid species. Also, the Caspian Tern, Common Tern, Ring-billed Gull, California Gull, and Black Tern are all at or near the northern limits of their Nearctic breeding range. In light of the evidence on climate warming trends, these species could be currently expanding their range northward. Warming trends may also favour the growth of local populations by enhancing the productivity of the lake. As indicated by the presence of countless vacant islands in GSL, the size of these populations is apparently limited more by the lake's low biological productivity than by the availability of nesting habitat.

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References

American Ornithologists' Union. 1983. Check-list of North American birds. 6th ed. 877 pp.

B.C. Research. 1978. Environmental survey, Phase II—bird census study, Pine Point, NWT. Unpubl. rep. for Cominco Ltd., Pine Point, NWT. 123 pp.

Cairns, D.K.; Elliot, R.D.; Threlfall, W.; Montevecchi, W.A. 1986. Researcher's guide to Newfoundland seabird colonies. Occas. Pap. No. 10, Biol. Ser., Memorial Univ. of Newfoundland, St. John's. 50 pp.

Cheng, T.; Bennett, R.M. 1975. Great Slave Lake water levels, 1934–1974. Unpubl. rep., Water Survey of Canada, Calgary. 129 pp.

Committee on the Status of Endangered Wildlife in Canada. 1990. Canadian endangered species. Ottawa.

Conover, M.R. 1983. Recent changes in Ring-billed and California gull populations in the western United States. Wilson Bull. 95(3): 362–383.

Ecoregions Working Group. 1989. Ecoclimatic regions of Canada. Ecol. Land Class. Ser. No. 23, Can. Wildl. Serv., Ottawa. 118 pp.

Environment Canada. 1990. HYDAT surface water data. Vol. 2, CD-ROM. Water Res. Branch, Ottawa.

Evans, R.M.; Krindle, D.B.; Mattson, M.E. 1970. Caspian Terns nesting near Spruce Island, Lake Winnipegosis, Manitoba. Blue Jay 28: 68–71.

Godfrey, W.E. 1986. The birds of Canada. Rev. ed. Nat. Mus. Can., Ottawa. 595 pp.

Jehl, J.R., Jr. 1987. Geographic variation and evolution in the California Gull (*Larus californicus*). Auk 104: 421–428.

Jehl, J.R., Jr.; Francine, J.; Bond, S.I. 1990. Growth patterns of two races of California Gulls raised in a common environment. Condor 92: 732–738.

Ludwig, J.P. 1965. Biology and structure of the Caspian Tern *Hydroprogne caspia* population of the Great Lakes from 1896–1964. Bird-Banding 36: 217–233.

Martin, M. 1978. Status report on Caspian Tern *Sterna caspia* in Canada. Comm. Status Endangered Wildl. Can., Ottawa. 42 pp.

McCormick, K.J.; Sirois, J. 1988. Larid breeding sites on the North Arm of Great Slave Lake, Northwest Territories: 1986. Tech. Rep. Ser. No. 30, Can. Wildl. Serv., Yellowknife. 44 pp.

Poston, B.; Ealy, D.M.; Taylor, P.S.; McKeating, G.B. 1990. Priority migratory bird habitats of Canada's prairie provinces. Can. Wildl. Serv., Edmonton. 107 pp.

Sirois, J.; Seddon, L. 1990. Status of larid breeding sites between Frank Channel and Yellowknife Bay, and other observations of larids in the North Arm of Great Slave Lake: 1988. Tech. Rep. Ser. No. 90, Can. Wildl. Serv., Yellowknife. 44 pp.

Sirois, J.; Cameron, G.B.; McCormick, K.J. 1989. Larid breeding sites between Yellowknife and Gros Cap, North Arm of Great Slave Lake, Northwest Territories, 1987. Tech. Rep. Ser. No. 69, Can. Wildl. Serv., Yellowknife. 42 pp.

Soper, J.D. 1952. Proposed bird sanctuary, Egg Island, Great Slave Lake, N.W.T. Unpubl. rep., Can. Wildl. Serv., Edmonton. 9 pp.

Trauger, D.L.; Bromley, R.G. 1976. Additional bird observations on the West Mirage Islands, Great Slave Lake, Northwest Territories. Can. Field-Nat. 90(2): 114–148.

Vermeer, K. 1970. Breeding biology of California and Ring-billed gulls. Rep. Ser. No. 12, Can. Wildl. Serv., Ottawa. 52 pp.

Weller, M.W.; Trauger, D.L.; Krapu, G.L. 1969. Breeding birds of the West Mirage Islands, Great Slave Lake, NWT. Can. Field-Nat. 83: 344–360.

Wiken, E. (ed.). 1986. Terrestrial ecozones of Canada. Ecol. Land Class. Ser. No. 19, Lands Direct., Environ. Can., Ottawa. 25 pp.

Winkler, D.W. 1985. Factors determining a clutch size reduction in California Gulls (*Larus californicus*): a multihypothesis approach. Evolution 39: 667–677.

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